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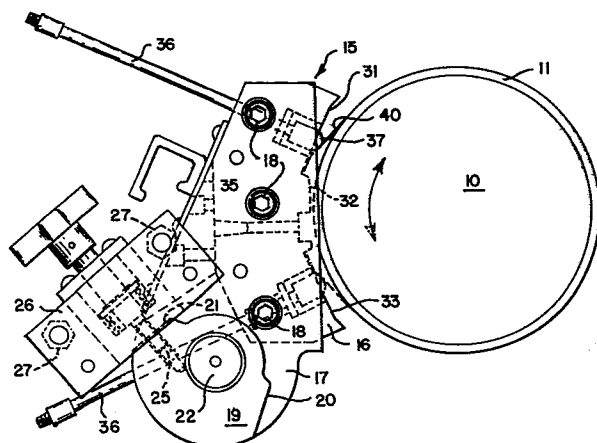
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⑤ Ink injector rail.

⑦ This invention describes an improved ink fountain for use with a high speed rotary printing press in which there is provided a fountain roller (10) which has a resilient outer ink receiving surface (11), an ink injector rail (15) connected to a source of pressurized ink and a flexible ink deflector blade (40) which extends across the length of the fountain roller and which is resilient enough that no metering or doctoring of the ink present on the surface of the fountain roller will take place.



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INK INJECTOR RAILBackground of the Invention

Field of the Invention. The process of lithographic printing utilizes inks which are extremely viscous, indeed almost essentially plastic, so that for a uniform film of ink to ultimately be supplied to the form roller from which the impression is received, the original viscous ink must be worked through a plurality of rollers comprising the inking train into a semi-liquid condition.

Description of the Prior Art. In the past, there have been several types of ink fountains which have been used in the lithography. For example, there is in existence an open fountain inker, often referred to as "undershot" in which the fountain works in conjunction with a slow speed fountain roller which is generally constructed of steel or some equally hard surfaced material. Acting in conjunction with this hard roll is a doctor or metering blade, which can be either segmented or continuous, that scrapes excess ink from the surface of the fountain roller to provide the desired thickness of ink on the roller while at the same time forming an ink reservoir. Fountains of this type have limitations in that they must be refilled by hand, or subject to ink leakage and, finally, since they are open, they are subject to contamination by water and paper dust from the traveling web.

A second type of open fountain inker that has been used in the past is referred to as an "overshot" inker and the mechanism of generating an ink film is akin to

that of the undershot inker with the exception that leakage can be avoided by placing the ink in a separate pan and then locating the doctor blade above the fountain roll. As was the case with the undershot inker, the
5 overshot inker must also be refilled by hand and an additional limitation is that its use is limited to inks which are thinner than those normally used in the lithographic process.

 A third type of inking arrangement that has been
10 used is called the injector inker and in this construction a rigid injector rail having a face that is curved to conform to the radius of curvature of the fountain roll is set about .008 inches away from the high speed copper covered fountain roller. Ink in this
15 arrangement is supplied from positive displacement ink pumps through connecting hoses coming from appropriate ink sources. Because of the speed involved, the roller shears the applied ink into a thin film and passes it on into the rest of the inking train. The difficulty with
20 this type of inker is that the high speed of the fountain roll results in ink being thrown at the rail-roller interface, i.e., an ink mist is generated which generally contaminates or dirties surrounding apparatus.

Summary of the Invention

25 A principal object of this invention is to provide an inking apparatus for a lithographic press in which no metering blade is used to apply a film to the fountain roller.

 Another object of this invention is to provide an
30 ink fountain for a rotary printing press in which the fountain roll has a resilient ink receiving outer surface and which is operated at a slow speed.

 A further object of this invention is to provide an
35 ink fountain for a rotary printing press in which the fountain rail has a flexible blade to smooth the surface of ink which has been applied to the fountain roll without affecting any metering or accumulation thereof.

Yet another object of this invention is to provide an ink fountain for a rotary printing press in which the fountain roll can be operated in either a clockwise or in a counterclockwise direction and still effect smoothing
5 of the ink which has been applied to the fountain roller.

Yet a further object of this invention is to provide an ink fountain where actuators are provided to move flexible ink smoothing elements into operating position against the fountain roll.

10 Other objects and advantages of this invention will be in part obvious and in part explained by reference to the accompanying specification and drawings in which:

Brief Description of the Drawings

Fig. 1 is a front elevational view of an ink
15 fountain of this invention showing the manner in which it is mounted on the side rails of the press;

Fig. 2 is an elevation of the view of Fig. 1 with the frame of the press removed for clarity;

Fig. 3 is an end elevation with portions removed to
20 illustrate the manner in which the flexible ink smoothing elements can be actuated to move into operating position against the fountain drum; and

Fig. 4 is a fragmented partially schematic view showing yet another way in which the flexible ink
25 smoothing elements can be actuated.

Description of the Preferred Embodiment

It was earlier mentioned that prior art inking systems generally were of two types, one type being of the open inking roller in which a steel or other hard
30 surfaced fountain roll was used in conjunction with a rigid metering blade which acted to reduce the thickness of the ink on the fountain drum to that desired for transfer on into the remainder of the inking chain. These systems were less than optimal due to problems such
35 as dust and water accumulation, leakage, etc. The other general type of inking system is that utilizing an inking rail having a plurality of outlet orifices extending across its width, generally one orifice for each print

column, these orifices being connected through rubber hoses to positive displacement pumps which supplied ink under pressure. As mentioned, the ink in this case was deposited onto a high speed rotating copper plate drum and dispersion with contamination of surrounding equipment was the result.

For a more detailed understanding of the present invention, reference is made to Figs. 1 and 2 of the drawings where the numeral 10 identifies the fountain roller and the numeral 11 is a layer of elastomeric material which has been applied to the outer surface of roll 10. Any type of elastomeric or metallic or any other material will be suitable so long as it is ink receptive. A fountain roll, of course, extends across the entire printing width of the press so that the entire plate surface which is to receive ink from it will be affected by the roll.

The ink injector rail which is associated with the ink fountain is identified in Fig. 1 of the drawings by the numeral 15. As was the case with the fountain roll, the ink injector rail extends across the entire width of the press and is, in fact, mounted between press frame members 12. The elongated body portion 16 of ink rail 15 is mounted at each end by means of mounting brackets 17 to which the body portion 16 is attached by means of recessed cap screws 18. The mounting brackets 17 are (as best shown in Fig. 2 of the drawings) provided with a raised boss 19 on each end. The boss has generally opposing edge surface portions 20 and 21, which are provided for reasons that will be explained later.

Each mounting bracket 17 is pivotally joined to a press frame member 16 by means of a trunnion 22. The purpose of providing trunnions 22 is to permit the entire ink injector rail assembly to be moved between an operative position immediately adjacent fountain roll 10 and a second or inoperative position removed from a location adjacent fountain roll 10 when it is desired to shut the apparatus down and effect cleanup or for

whatever other purpose it may be desired.

As can be seen most clearly in Fig. 2 of the drawings, the injector rail 15 is held in engaged position by means of the lock pins 25 which can be threaded inwardly against the trunnion 22 so that when the rail 15 is in the desired position, it can be locked there without concern for its being accidentally moved. The lock pins 25 extend upwardly from an appropriate recess in the block member 26 which is rigidly attached to frame member 12 by means of bolts 27 or the like. Referring once again to Fig. 2 of the drawings, it can be seen that the edge 21 of the boss member 19 is in contact with the lower edge of block member 26, thus providing a positive stop preventing further rotation of the ink rail toward the fountain roll 10. Obviously, upon pivoting the ink rail in the counterclockwise direction, the lower edge surface 20, as viewed in the Figure, will, with continuing rotation, finally also come into abutting relationship with the lower surface of block 26 thereby providing a positive stop for locating the ink rail in its non-operative position.

Turning now to Fig. 3 of the drawings, for a clearer understanding of the construction of the ink injector rail body 16, it will be seen that the body has an inner wall 30 that is configured to approximate the curvature of the outer surface of the fountain roll 10. Obviously, this inner surface is not arcuate as is the outer surface of the roll but is instead comprised of a plurality of planar surfaces which are interconnected at angles that do, in fact, result in wall 30 approximating the curvature of the surface of fountain roll 10. The principal purpose for utilizing a series of interconnected planar faces is merely to provide additional clearance for certain mounting parts as explained subsequently.

In the construction illustrated in Fig. 3, the inner wall 30 on the elongated body 16 is comprised of at least three individual faces 31, 32 and 33. There are in

addition two smaller planar faces located beyond the
outermost of the two planar faces 31 and 33 but there is
no particular significance attached to the angular
disposition of these faces. The elongated body 16, in
5 addition to having its inner face 30 configured to
approximate the curvature of the fountain roll 10, also
includes a plurality of ink supply openings 35 (connected
to ink supply pumps not shown) which are positioned at
locations along the length of the rail that correspond to
10 a column of printed matter. These holes extend
completely from the outside surface to the inside surface
of body 16 and are preferably countersunk on the inner
side to provide for a better distribution of ink on the
roll to conform roughly to the column width.

15 The elongated body 16 also includes, on each side of
the ink supply passage 35, fluid conducting conduits 36,
which are connected to a source of pressurized fluids not
shown. The supply conduits 36 are connected to bag- or
bellows-like elements 37 that are positioned within
20 recesses 38 extending inwardly from the inner surface 30
of the rail. The function of the bellows 37 is to expand
and exert a force against the upper surface of spring
elements 40 and to move them downwardly against the outer
surface of rail 10, when desired. The spring elements 40
25 are constructed in the form of one continuous element
that extends across the entire lateral width of the
fountain roll and are constructed of a springlike
resilient material that cannot exert any sort of metering
effect on the ink that is being introduced through the
30 supply passage 35. By constructing elements 40 of a
springlike resilient material, no metering can be
effected, as already noted, and further there can be no
accumulation of ink behind the resilient leaf which would
cause the ink to spread out laterally in each direction.
35 This is an important result in the present invention
since it provides for the utilization of different colors
of ink in different columns without any of the colors
being moved laterally.

Again referring to the drawings, it will be seen that each of the springs 40 is attached to the planar surface 31 or 33 adjacent the central planar surface 32 only along that edge which is nearest to the ink supply openings. Attachment of the spring elements 40 to their
5 respective inner faces 31 and 33 is shown as being accomplished by threaded fastening members 41 but it is obvious that any sort of suitable fastening means could be utilized. The ink injector rail is provided with a
10 smoothing element 40 on each side of the central face 32 so that, depending upon which one of the bellows 37 is actuated, the roll can be rotated in either a clockwise or a counterclockwise direction.

Referring to Figure 4 of the drawings, there is
15 shown an alternative construction for effecting movement of the spring elements 40 away from the inner surface 30 of injector ink rail 15 toward the surface of the fountain roll 10. Specifically, recesses similar to the recesses that receive the bellows 36 in the type of
20 apparatus shown in the other figures are provided. In this case, however, the recesses have a generally circular configuration and receive cams 45 which can be mechanically turned to depress one or the other of the
spring elements 40, as illustrated in the drawing. When
25 the cam is returned to the recessed position, the natural resiliency of the elements 40 will, as is the case in the alternative configuration, cause it to be returned to the uppermost position against the face of the injector rail.

Although the present invention has been described in
30 connection with the preferred embodiments, it is to be understood that modifications and variations may be resorted to without departing from the spirit and scope of the invention as those skilled in the art will readily understand. Such modifications and variations are
35 considered to be within the purview and scope of the invention and the appended claims.

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What we claim is new and desired to secure by letters patent in the United States is:

1. In a rotary printing press including plate and blanket rolls and inking rolls, the combination of an improved inking system, said improved inking system comprising:
 - (a) an ink fountain roll;
 - (b) an ink injector rail mounted adjacent said fountain roll for movement between an operative position where ink can be deposited on said fountain roll and an inoperative position where it is not, said ink injector rail having resilient means dependent therefrom to smooth the surface of ink deposited on the surface of said fountain roll without effecting metering thereof; and
 - (c) an ink metering pump connected to a source of ink and to said injector rail to supply metered amounts of ink to said injector rail for subsequent uniform deposition on said fountain roll.
2. The combination as defined in claim 1 wherein said ink injector rail includes operator means to move said resilient means into contact with the surface of said fountain roll.
3. The combination as defined in claim 2 wherein said operator means is mechanically actuated.
4. The combination as defined in claim 2 wherein said operator means is fluid actuated.
5. The combination as defined in claim 1 wherein said ink injector rail comprises an elongated body having a plurality of ink supply openings extending therethrough

at locations along the length of said body corresponding to the locations of the columns of matter to be printed and wherein there is an individual metering pump connected to each of said ink supply openings.

5 6. A rotary printing press as defined in claim 1 wherein said ink fountain roll has a resilient outer surface.

 7. The combination as defined in claim 5 wherein there are two of said resilient means dependent from said
10 ink injector rail to smooth the surface of ink deposited on the fountain roller, each of said two dependent means being attached to said rail adjacent said ink supply openings so that they can be operated selectively to enable operation of the fountain roll in each direction
15 of rotation.

 8. In an ink fountain for a rotary printing press in which ink is supplied by a pressurized metering system the combination of:

 (a) a fountain roller having a resilient outer ink
20 receiving surface or an ink receptive metallic or any other ink receptive surface; and

 (b) an ink injector rail mounted adjacent said fountain roller for movement between operating and non-operating positions with respect to said fountain
25 roller, said ink rail comprising:

 1) an elongated body having ink supply openings extending therethrough at locations along its length which corresponds to a column of print and having an inner wall configured to approximate the curvature
30 of the outer surface of said fountain roll;

 2) a flexible ink deflector blade of a length approximating the width of said fountain roller;

 3) means securing that side of said deflector blade nearest to the ink supply openings to the
35 inner wall of said elongated body so that the opposite end thereof is free for movement toward and away from the outer surface of said fountain roll; and

 4) operator means carried by said elongated body

to move the non-secured edge of said ink deflector blade into operative contact with the outer surface of said fountain roll to smooth out ink as it is introduced from the ink supply.

5 9. An ink fountain as defined in claim 1 wherein **there are two ink deflector blades, each blade being** attached to said inner wall only on its end nearest to the ink supply openings.

10 10. An ink fountain as defined in claim 1 wherein said operator means includes a rotatable cam element to exert actuating force against said ink deflector blade.

15 11. An ink fountain as defined in claim 1 wherein said operator means includes an element having a surface that is movable substantially linearly against said ink deflector blade to move said blade into operating position.

12. An ink fountain as defined in claim 4 wherein said element having said moving surface includes an inflatable body.

20 13. In an ink fountain for a rotary printing press in which ink is supplied by a pressurized metering system the combination of:

(a) a fountain roller having an resilient outer ink receiving surface; and

25 (b) an ink injector rail mounted adjacent said fountain roller for movement between operating positions with respect to said fountain roller, said rail comprising:

30 1) an elongated body having ink supply opening extending therethrough at locations along the length of said body corresponding to the location of the column of matter to be printed, said openings further being located approximately midway between longitudinally extending side walls of said body;

35 2) an inner wall on said elongated body having at least three individual faces that are interconnected and are oriented toward the outer surface of said fountain roller in such a way that said inner wall

approximates the curvature of the outer surface of said fountain roll;

5 3) a flexible ink deflector blade attached to each of the two faces located on each side of the central most of the said three faces, said blades being attached only along the edge adjacent said central face.

10 4) means defining a cavity located in said elongated body in back of each of said deflector blades; and

5) operator means contained with each said cavity for urging the associated deflector blade toward said fountain roller when desired.

15 14. An ink fountain as defined in claim 6 which wherein said three individual faces of said inner wall are planar.

20 15. An ink fountain as defined in claim 6 wherein the plane of each of said three faces comprising said inner wall are substantially normal to a radius originating from the axis of rotation of said fountain roller.

25 16. An ink fountain as defined in claim 6 wherein the central most of said three planar faces is located closer to the axis of rotation of said fountain roller when said rail is in operating position than are the other two of said three faces.

17. An ink fountain as defined in claim 6 wherein said operator means are expandable by the introduction of fluid from a suitable source.

30 18. An ink fountain as defined in claim 6 wherein said operator means is a rotatable cam.

Fig. 2.

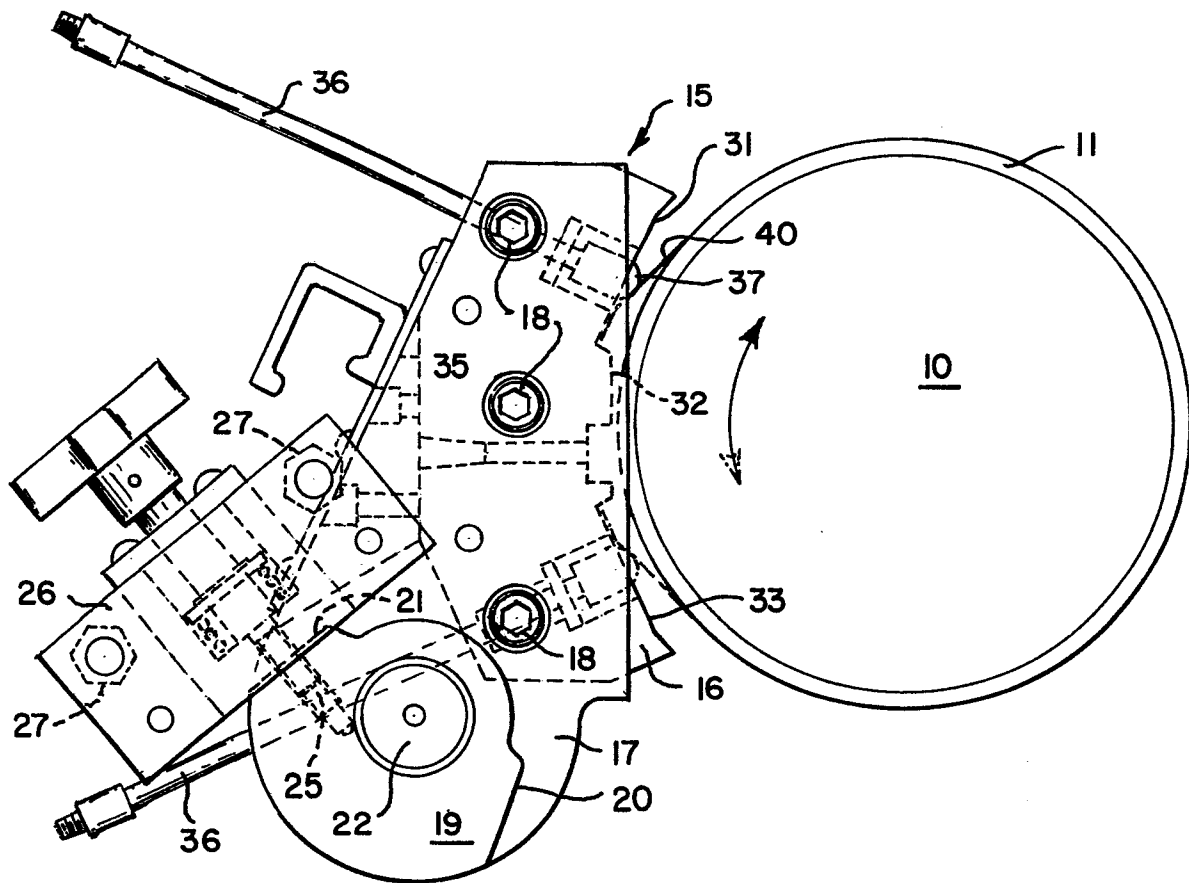


Fig. 4.

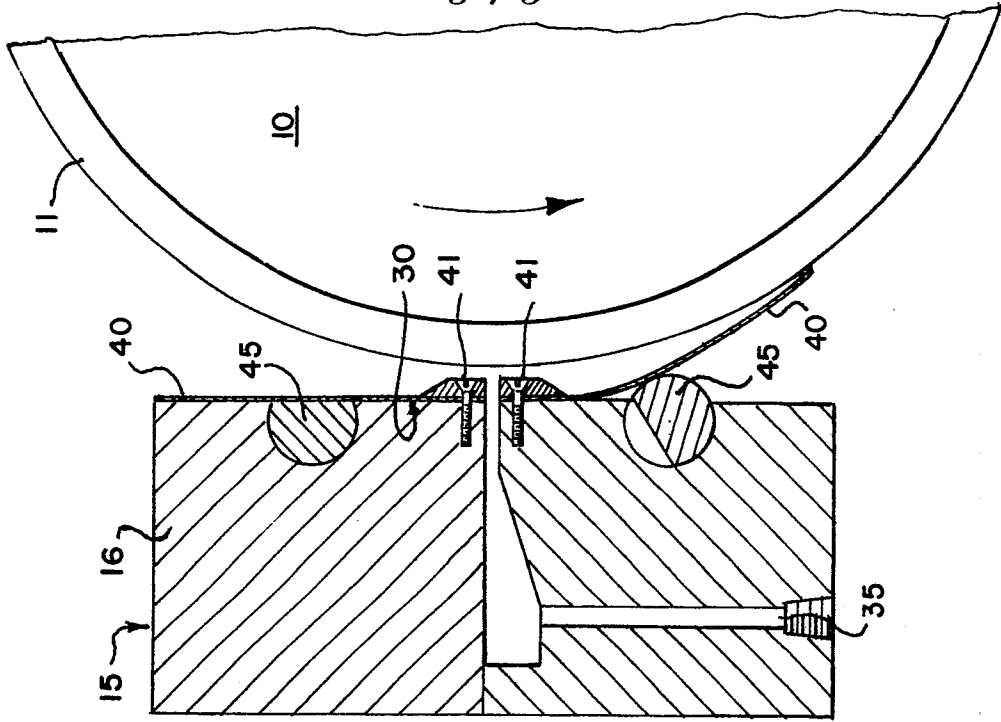
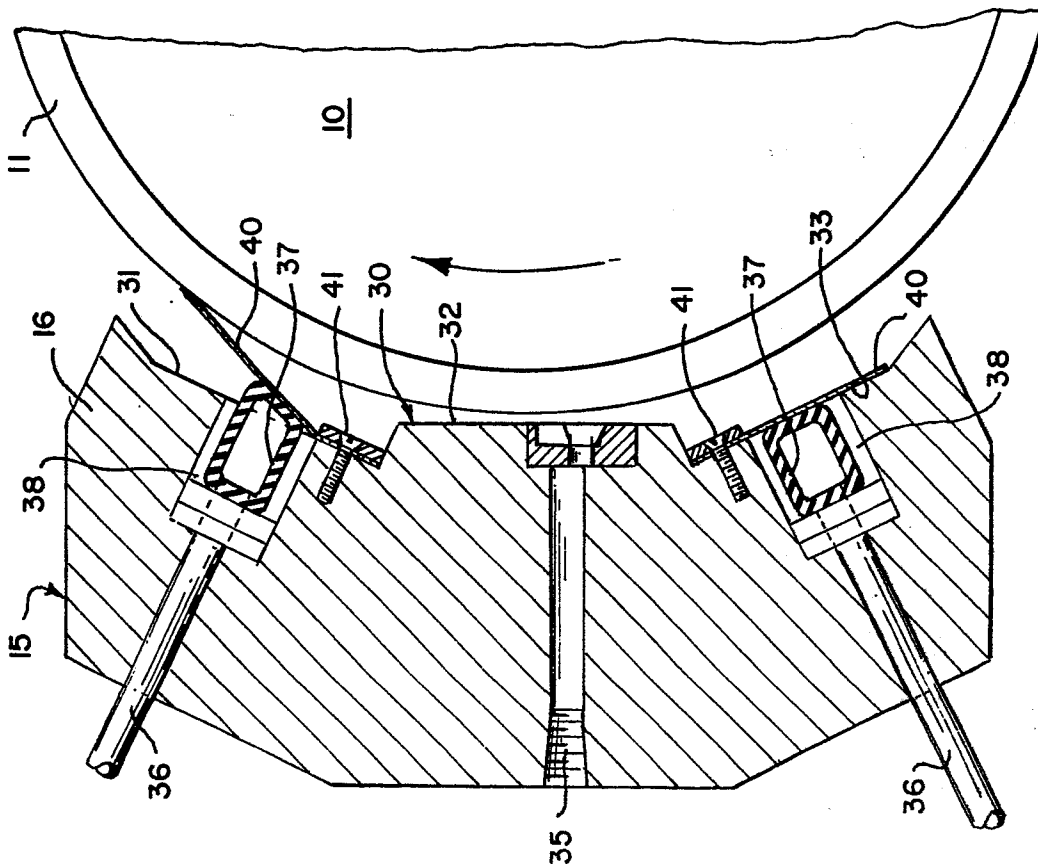


Fig. 3.





DOCUMENTS CONSIDERED TO BE RELEVANT				
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. 3)	
Y	GB-A- 434 107 (KOENIG) * Page 2, line 54 - page 4, line 16; figures *	1,8	B 41 F 31/08	
A	---	13		
Y	GB-A- 295 851 (HOE) * Page 1, line 100 - page 2, line 102; figures *	1-3,8		
A	---	13		
A	US-A-3 882 817 (BLACK CLAWSON) * Column 5, line 59 - column 6, line 15; figures 1,3 *	4,11,12,17		
A	DE-C- 427 090 (VOGTLANDISCHE MASCHINENFABRIK) * Page 2, lines 50-87; figure *	3,10,18		TECHNICAL FIELDS SEARCHED (Int. Cl. 3) B 41 F B 05 C
A	US-A-3 018 727 (HOE) * Column 1, lines 9-15; column 1, lines 44-66; figures *	5		-----
The present search report has been drawn up for all claims				
Place of search THE HAGUE		Date of completion of the search 27-02-1984	Examiner LONCKE J.W.	
CATEGORY OF CITED DOCUMENTS		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document		
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document				